Standards for Mathematical Practice:
Standard 6. Attend to Precision

The Standard:
Mathematically proficient students try to communicate precisely to others. They try to use clear definitions in discussion with others and in their own reasoning. They state the meaning of the symbols they choose, including using the equal sign consistently and appropriately. They are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem. They calculate accurately and efficiently, express numerical answers with a degree of precision appropriate for the problem context. In the elementary grades, students give carefully formulated explanations to each other. By the time they reach high school they have learned to examine claims and make explicit use of definitions.

Classroom Observations:
Teachers who are developing students’ capacity to "attend to precision" focus on clarity and accuracy of process and outcome in problem solving. A middle childhood teacher might engage his students in a "number talk" in which students use an in/out table and a plotted graph to "guess [the teacher’s] number." An early adolescence teacher might distribute cards with different symbol strings to his students, asking them to mingle to group and categorize their symbol strings, explaining and defending their groupings. A teacher of adolescents and young adults might continually probe her students to defend whether their requirements for a particular quadrilateral will always be the case, or whether there are some flaws in their group’s thinking that they need to refine and correct. Visit the video excerpts at Inside Mathematics website: http://www.insidemathematics.org/index.php/mathematical-practice-standards to view multiple examples of teachers engaging students in attending to precision.

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<tr>
<th>Students:</th>
<th>Because Teachers:</th>
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<tr>
<td>- Calculate accurately and efficiently</td>
<td>- Recognize and model efficient strategies for computation</td>
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<tr>
<td>- Explain their thinking using mathematics vocabulary</td>
<td>- Use (and challenge students to use) mathematics vocabulary precisely and consistently</td>
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<tr>
<td>- Use appropriate symbols and specify units of measure</td>
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<tr>
<th>Math Practice</th>
<th>Key Points</th>
<th>Students might think or do:</th>
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| Attend to Precision | - Use clear definitions in discussion with others and in their own reasoning.  
- State the meaning of the symbols they choose, including using the equal sign consistently and appropriately.  
- Are careful about specifying units of measure, and labeling axes to clarify the correspondence with quantities in a problem.  
- Express numerical answers with a degree of precision appropriate for the problem context. | - A student rewrites his explanation to a problem using appropriate mathematics vocabulary.  
- A student learns why it is incorrect to write 14 + 4 = 18 + 5 = 23 x 2 = 46  
- "My calculator says 3.581279, but since I’m asked to find the number of inches, that’s not a number that makes sense to write for a measurement in inches. I’ll say 3.5" or 3.6". |

Math Solutions

Education Development Center, Inc.
### Attend to Precision  
*MP6*

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<th>Practice</th>
<th>Needs Improvement</th>
<th>Emerging (teacher does thinking)</th>
<th>Proficient (teacher mostly models)</th>
<th>Exemplary (students take ownership)</th>
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| **Attend to Precision** | **Task:** ◊ Gives imprecise instructions.  
**Teacher:** ◊ Does not intervene when students are being imprecise  
◊ Does not point out when students fail to address the question completely or directly. | **Task:** ◊ Has overly detailed or wordy instructions.  
**Teacher:** ◊ Inconsistently intervenes when students are imprecise.  
◊ Identifies incomplete responses but does not require student to formulate further response. | **Task:** ◊ Has precise instructions.  
**Teacher:** ◊ Consistently demands precision in communication and in mathematical solutions.  
◊ Identifies incomplete responses and asks student to revise their response. | **Task:** ◊ Includes assessment criteria for communication of ideas.  
**Teacher:** ◊ Demands and models precision in communication and in mathematical solutions.  
◊ Encourages student to identify when others are not addressing the question completely. |

### Questions to Develop Mathematical Thinking

- What mathematical terms apply in this situation?
- How did you know your solution was reasonable?
- Explain how you might show that your solution answers the problem.
- Is there a more efficient strategy?
- How are you showing the meaning of the quantities?
- What symbols or mathematical notations are important in this problem?
- What mathematical language..., definitions..., properties can you use to explain? How could you test your solution to see if it answers the problem?